

U.S. Serial No. 10/675,169
Reply to Office Action of: September 6, 2005
Family Number: P2002J108

II. SPECIFICATION AMENDMENTS

1. Please replace paragraph [0001] on page 1 of the specification with the following replacement paragraph.

[0001] This application claims the benefit of U.S. Provisional application 60/435,044 filed December 20, 2002, and is a continuation-in-part of U.S. Patent Application Serial No. 09/312,728 filed May 14, 1999, currently abandoned, continuation U.S. Patent Application Serial No. 09/791,996 filed February 23, 2001, currently abandoned, and continuation U.S. Patent Application Serial No. 10/412,190 filed April 11, 2003, currently pending.

2. Please replace paragraph [0010] on page 2-3 of the specification with the following replacement paragraph.

[0010] A conventional fuel cell system comprises a source of fuel, a source of water, a source of air, a reformer, a water gas shift reactor, reactors for converting CO to CO₂ and a fuel cell stack. A plurality of fuel cells operably connected to each other is referred to as a fuel cell stack. Figure 1 shows a schematic of one embodiment of a prior art hydrogen generator based on a hydrocarbon liquid fuel and using partial oxidation/steam reforming to convert the fuel into a syngas mixture. This system design is similar to that being developed by A. D. Little, except for the allowance of feeding water to the reformer to practice autothermal reforming (Ref.: J. Bentley, B. M. Barnett and S. Hynke, 1992 Fuel Cell Seminar - Ext. Abs., 456, 1992). The process in Figure 1 is comprised as follows: Fuel is stored in a fuel tank (1). Fuel is fed as needed through a preheater (2) prior to entering the reformer (3). Air (4) is fed to the reformer (3) after it is preheated by the air preheater (5). Water is stored in a reservoir tank (6). A heat exchanger (7) is integral with a portion of tank (6) and can be used to melt portions of the water if it should freeze at low operation temperatures. Some water from tank (6) is fed via stream (9) to preheater (8) prior to entering the reformer (3). The reformed syngas product is combined with additional water from tank (6) via stream (10). This humidified syngas mixture is then fed to reactors (11) which perform water gas shift (reaction of CO and water to produce H₂) and CO cleanup. The H₂ rich-fuel stream then enters the fuel cell (12) where it reacts

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electronically with air (not shown) to produce electricity, waste heat and an exhaust stream containing vaporized water. A hydrogen-oxygen fuel cell as used herein includes fuel cells in which the hydrogen-rich fuel is hydrogen or hydrogen containing gases and the oxygen may be obtained from air. This stream is passed through a condenser (13) to recover a portion of the water vapor, which is recycled to the water reservoir (6) via stream (14). The partially dried exhaust stream (15) is released to the atmosphere. Components 3 (reformer) and 11 (water gas shift reactor) comprise a generalized fuel processor.

3. Please replace paragraph [0018] on page 7 of the specification with the following replacement paragraph.

[0018] The water component of the emulsion composition of the instant invention comprises water that is substantially free of salts of halides sulfates and carbonates of Group I and Group II elements of the long form of The Periodic Table of Elements. Group I elements include H, Li, Na, K, Rb, Cs, and Fr. Group II elements include Be, Mg, Ca, Sr, Ba, and Ra. Distilled and deionized water is suitable. Water generated from the operation of the fuel cell system is preferred. Water-alcohol mixtures can also be used. Low molecular weight alcohols selected from the group consisting of methanol, ethanol, normal and iso-propanol, normal, iso and secondary-butanol, ethylene glycol, propylene glycol, butylene glycol and mixtures thereof are preferred. The ratio of water:alcohol can vary from about 99:1:0.1 to about 20:80, preferably 90:10 to 70:30.

4. Please replace the abstract of the disclosure (page 22) with the following replacement section:

ABSTRACT OF THE DISCLOSURE

The present invention ~~relates~~ is directed to oil-in-water-in-oil (O/W/O) emulsion compositions for starting a reformer of a fuel cell system. In particular, the invention includes The oil-in-water-in-oil (O/W/O) emulsion compositions include comprising hydrocarbon fuel, water, alkoxylated alkyl alcohol, alkoxylated alkyl ester and alkyl polyglycerol surfactants, and are used for starting a reformer of a fuel cell system.